CLAIMS

1. Molecularly imprinted microspheres comprising specific binding sites, obtainable by polymerising functional monomers and crosslinkers in a reaction solvent in the presence of print molecules as templates in a surfactant-free precipitation polymerisation process, which print molecules are capable of forming non-covalent or reversible covalent interactions with said functional monomers.

2. Molecularly imprinted microspheres according to claim 1, the diameter of which are within the range of 0.01 to 10μm.

3. Molecularly imprinted microspheres according to claim 1, which are monodisperse.

4. A method of producing molecularly imprinted microspheres comprising specific binding sites, c h a r a c t e r i s e d by polymerising functional monomers and crosslinkers in a reaction solvent in the presence of print molecules as templates in a surfactant-free precipitation polymerisation process, which print molecules are capable of forming non-covalent or reversible covalent interactions with said functional monomers.

5. A method according to claim 4, wherein the total volume of polymerisable monomers and crosslinkers is kept in the range of about 0.01 to 20 % of the volume of the reaction solvent.

6. A method according to claim 4 or 5, wherein the reaction solvent is aqueous or non-aqueous.

7. A method according to claim 4 or 5, wherein said reaction solvent is composed of a single solvent component or of multiple solvent components.

8. A method according to claim 4, wherein said functional monomers have the same functionality.

9. A method according to claim 4, wherein said functional monomers have different functionality.

10. A method according to claim 4 or 5, wherein the solubility of the print molecules in the reaction solvent is adjusted by changing the composition of the reaction solvent.

11. A method according to claim 4, wherein the polymerisation is induced by heat, UV radiation, γ radiation and/or chemically.

12. A method according to claim 4, wherein said polymerisation process is a free-radical polymerisation process, an ionic polymerisation process, a coordination polymerisation process or a step growth polymerisation process.

13. A method according to claim 4 or 5, wherein a desired size of the microspheres is achieved by controlling the nucleation and particle growth process.

14. A method according to claim 13, wherein the control of the nucleation and particle growth process is achieved by adjusting the composition of the functional monomer/crosslinker/solvent system and/or the reaction conditions during the polymerisation in order to change the solubility of the growing polymer chains.

15. A method according to claim 13, wherein the control of the nucleation and particle growth process is such as to avoid aggregation of the microspheres.

16. A method according to claim 4 or 5, wherein the size of the microspheres as produced is in the range of 0.01-10μm.

17. A method according to claim 4 or 5, wherein the reaction conditions are controlled so that the microsperes become monodisperse.

18. Use of the molecularly imprinted microspheres as defined in any one of claims 1-3, or prepared according to any one of claims 4-17, for screening of chemical libraries, for catalysis, for facilitating synthesis, for analyte determination using ligand binding assays and/or agglutination assays, for therapeutic purposes, or for controlled release.

19. Use of the molecularly imprinted microspheres as defined in any one of claims 1-3, or prepared according to any one of claims 4-17, as stationary phase or modifier in capillary electrophoresis, capillary electrochromatography or HPLC analysis.

20. Use of the molecularly imprinted microspheres as defined in any one of claims 1-3, or prepared according to any one of claims 4-17, as recognition component in biomimetic sensors.

21. Use of the molecularly imprinted microspheres as defined in any one of claims 1-3, or prepared according to any one of claims 4-17, as affinity-labelled probe for targeting cells or other biological material.

22. Use of the molecularly imprinted microspheres as defined in any one of claims 1-3, or prepared according to any one of claims 4-17, as binding entities for the preparation of composite materials.